Formalisms for Embedded Systems Architecture Description

- workshop within the CPSweek arranged by ICES with support from the ArtistDesign network

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Program

9.15: Introduction and overview

9.30: On a Specific Model-based Architecture Description Language: the Standards-Based Approach

- Keynote talk by Bran Selic and Sebastien Gerard

10:30 Brief presentations/overviews of selected ADL's and visual languages

- AADL, Prof. Mamoun Filali, CNRS
- Autosar, Prof. Jakob Axelsson, Volvo car and MDH
- DSL's, Juha-Pekka Tolvanen, MetaCase
- EAST-ADL, Dr Henrik Lönn, Volvo technology
- Hardware description languages, Sandro Penolazzi, KTH

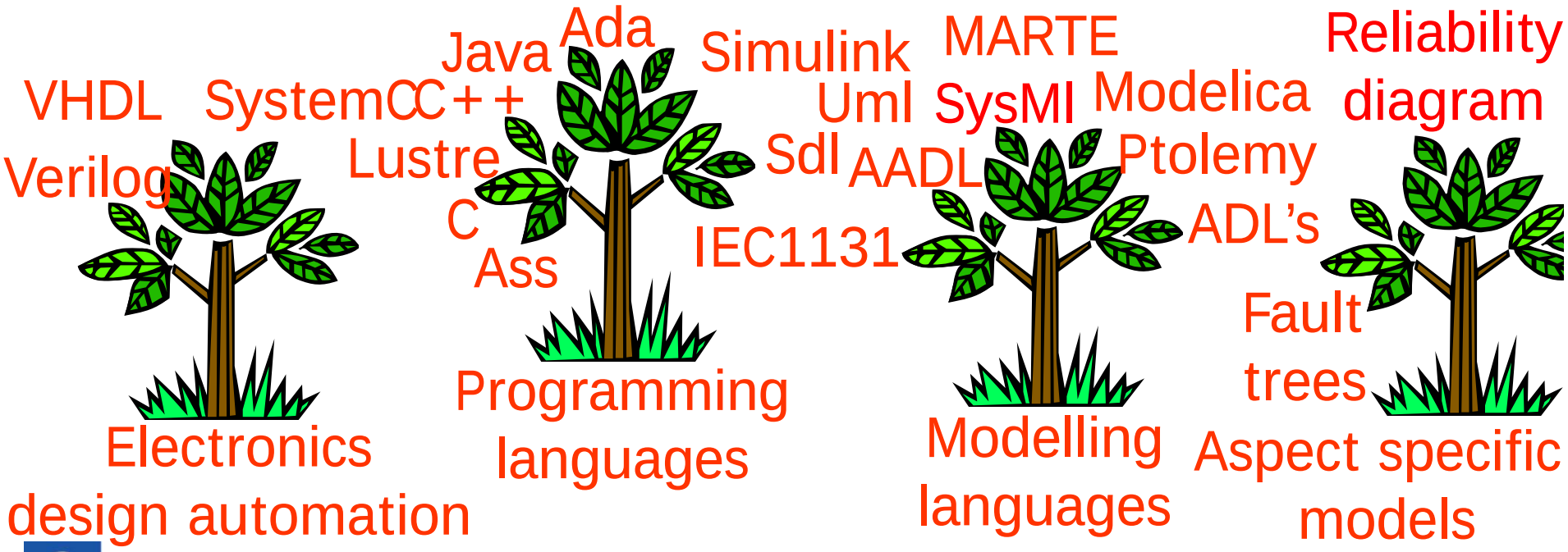
11.45: Lunch

13.15: Panel debate – Maturity, adoption and trends

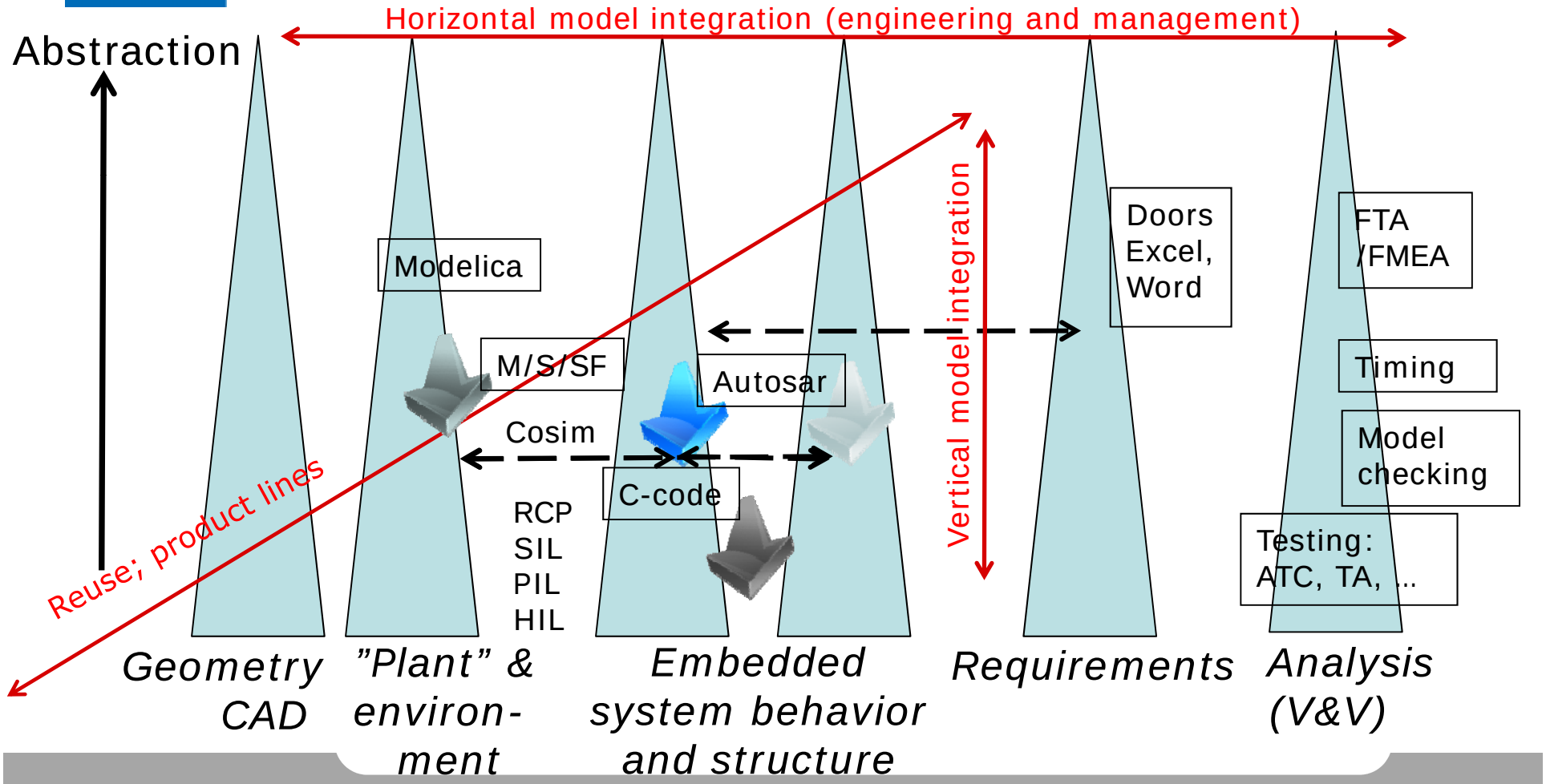
~ 14.15: Conclusions and introduction to the hands-on part.

- Walk to hands-on lab session

The challenge of multiple modeling formalisms



Model based engineering - Existing design flows and gaps



Formalisms for embedded systems architecture description – Needs??

- Communicate; visualize complex systems
- Formalize complex systems as a basis for documentation, analysis and synthesis

Subsequent questions

- Which formalism(s)?
- Which levels of abstraction(s)?
- Which tool(s)

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Goals and Questions

- What are key formalisms for design of embedded systems?
  - What constitutes an ADL?
- What is the maturity (languages, tools) and industrial adoption of such formalisms?
- What are the industrial expectations on and experiences in adopting such tools?
- Which formalism best suits different types of systems and design tasks?
- What are the outstanding issues to pave way for larger scale industrial adoption.

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ICES – Innovative Centre for Embedded Systems

- A KTH-based centre on Embedded systems
- Current members:
  - ABB, Enea, Ericsson, Freescale, Prevas, Scania, Semcon/EiS, Stoneridge, ÅF
  - KTH schools: CSC, EES, ICT, ITM
- ICES functions as a Network & Catalyst
  - Services for industry, students and faculty
  - Seminars, inventory, education, research
  - Initiated 2008. ”Spin-off effects” in the order of *x 10*
  - Networking internationally and nationally

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Key industrial challenges as identified by ICES member companies

- System Architecture
  - Hardware and software, Integration
  - Conflicting properties
- Software Verification
  - Additional level of complexity
- Methodology
  - Workable and systematic methods and tools!

Integration problems

Topics correlate nicely with intersection between many research groups!

ICES events and how to take part!!

- Work groups: Marketing, Education, Research, Seminars, PhD student group
- ICES networking – ICES think tank
- Seminars and conference 2010
  - Modeling languages for visualization and architecting
    - 2010-04-12 - http://www.cpsweek2010.se/
  - Embedded systems security
    - 2010 -05-19
  - New KTH lab seminar series 2010
  - ICES conference on Networked Embedded Systems
    - 2010-09-02
- Windows of opportunities! (ICT-Labs, Artemis, and more)

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Additional questions

- Structure vs. Behavior → which properties
- Level of formalization; visualization vs. formalization
- Trends?
- Convergence?
- CESAR project

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Panel topics!

- Key topics and challenges?
- Suggestions for academic research and education?
- Follow-up ideas
  - Follow-up seminars?
  - Collaboration forms?

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Hands-on sessions

- AADL - the Architecture and Analysis Description Language
- EAST-ADL, architecture description language for automotive embedded systems, complementing AUTOSAR
- Transaction level hardware design using VHDL
- Domain specific ADL's, using a meta-modeling environment
- Rubus Component and SW Architecture environment

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Logistics!

- Check how many intend to join the hands-on session!

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